

The fourth annual Kim Iles **Western Mensurationists Mathematical Challenge** is now available.

Written responses are invited until the Western Mensuration meeting in Victoria, and glory will be heaped upon the winner. By that, we mean for the best effort, even if it is not complete, accurate or adequately simplified. Iterative solutions are accepted, if the author cannot do better.

So far, none of the previous yearly challenges have produced correct or simple solutions, although last year there were several group efforts at dinner which were at least close. The answer must, of course, include the mathematical reasoning leading to the result.

Two parts are included in the challenge this year.

It might help to read the questions closely. Better answers than the author provided will be additionally rewarded.

#4th Year, Kim Iles Challenge

- 1) A new manufacturer has an instrument that can tell if a tree is “in or out”, with Variable Plot Sampling (and they say it will work with Fixed Plot Sampling) - but if the tree is within $+X\%$ or $-X\%$ of the correct critical distance, it just chooses “in or out” *randomly*.

Question : Is the tree count biased for either Fixed or Variable Plots ?, and if so what is a simple way to determine what the amount of bias would be for the $\pm X\%$ percent of uncertainty they admit to?

- 2) An owner is willing to use fertilizer, but is unconvinced that it will get a larger basal area growth. He says that if you can show that more than half his trees are growing at a greater rate in 5-year basal area *after* fertilization, he will use it. Fortunately, a number of fertilized trees were felled recently, with very visible and concentric growth rings. Perhaps after answering his question the decision needs no further arguments (although there are some).

Question : How can we most quickly determine if most of them grew at a greater basal area rate in the period following fertilization ?

Unfortunately, all you have today is a **Biltmore Stick**, to work with (but you have a calculator on your phone). How can you most easily answer the question for these stumps ... an example of a few stumps is shown below.

